HEWLETT PACKARD

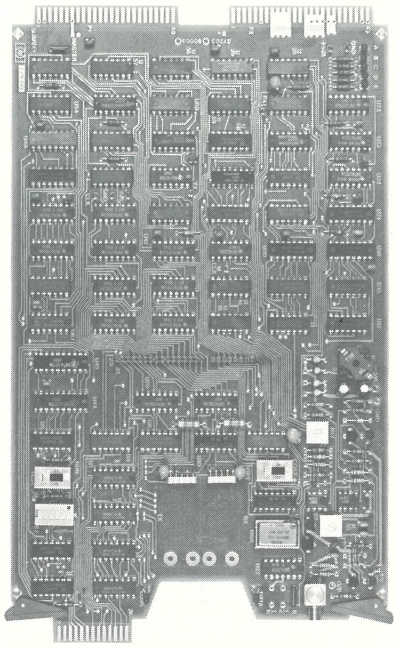
HP-IB EXTENDER

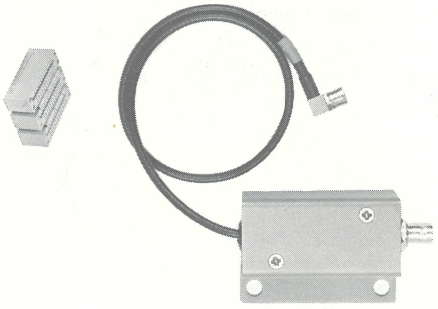
Model 37203L

TECHNICAL DATA JULY 1981

The 37203L HP-IB Extender enables HP-IB systems to be interconnected over distances up to 1000 metres using coaxial cable or, with Option 001, fiber optics.

HP-IB Extenders overcome the limitation that the total length of HP-IB cable in any system should not exceed 2 metres per device or 20 metres total, whichever is less. This is a fundamental limitation which applies to all devices designed to comply with IEEE Standard 488-1978 and other similar interface standards.





Features

- Transparent extension of HP-IB up to 1000 metres.
- Plugs directly into the 2250 Measurement and Control Processor or HP 1000 L-series Computers.
- Data transfer rates up to 50 kbytes/s.
- Supports all HP-IB functions.
- Transmission over coaxial cable or optical fiber.
- Electrical isolation plus error detection and correction ensures data integrity across link.
- Fully compatible with 37203A HP-IB Extender.

Functional Description

The 37203L is a single card version of the 37203A HP-IB Extender designed for installation into the 2250 Measurement and Control Processor or HP 1000 L-series Computers. Operating in conjunction with a 37203A or another 37203L at the other end of the link, the product provides serial extension of HP-IB up to 1000 metres. The 37203A/L link is transparent to all HP-IB functions and normally no special programming is required to extend existing systems.

Speed and Range

The maximum HP-IB byte rate between 37203A/L's is determined by several factors including serial transmission rate, link propagation delay and the source and acceptor handshake rates of the slowest devices configured on the bus at either end of the link.

When operating over coaxial cable the usable range of the 37203L is limited by the attenuation characteristic of the cable. Using the recommended cable (or an equivalent type) transmission range is up to 250 metres at the normal serial transmission rate. At $1/4$ of the normal rate the range is increased to 500m. A further increase in range up to 1000m can be achieved by reducing the rate to $1/16$ of the normal rate.

With the optical fiber option (Opt 001) fitted, the 37203L operates over distances up to 1000m at the normal serial transmission rate.

DESIGNED FOR HP-IB SYSTEMS

HP-IB: Not just IEEE-488, but the hardware, documentation and support that delivers the shortest path to a measurement system.

The table shows the maximum HP-IB transfer rate, the maximum SRQ (Service Request) propagation delay and the Parallel Poll response times achieved over various links using 37203A/L's. The quoted maximum transfer rate assumes that the speed of the 37203L is not reduced by the effect of other devices connected to the bus.

Nominal HP-IB Transfer Rates and Response Times

	Max HP-IB byte transfer rate (kbytes/s)	Max SRQ propagation delay (μs)	Max Parallel Poll response time (μs)
Coaxial Cable			
Short* (at normal speed)	50	14	20
250m (max range at normal speed)	40	18	25
500m (max range at 1/4 speed)	14.2	55	75
1000m (max range at 1/16 speed)	2.75	200	270
Fiber Optics (Opt 001)			
Short*	50	14	20
250m	39	20	25
1000m	25	30	40

*For distances < 250m, interpolate between Short and 250m.

HP-IB Functions Supported

The 37203L provides transparent extension of all HP-IB functional procedures. This means that it is normally possible to insert a pair of 37203A/L's into an HP-IB system without the need to alter controller programming. The only exceptions are where the information transfer rates and response times achieved over the extended link preclude normal system operation.

Parallel Poll Function

The 37203L supports the Parallel Poll function but, because of the absolute transmission delay, a guaranteed response cannot be delivered within 200ns as required by the IEEE standard. Instead, the response from distant devices is returned as rapidly as possible and within the times shown in the table. This does not affect the response from local devices.

Transmission Over Coaxial Cable

The standard serial link between 37203A/L's is a single coaxial cable used for transmission in both directions. Coaxial cable was chosen for this link because it is relatively cheap, easy to handle, and easy to obtain.

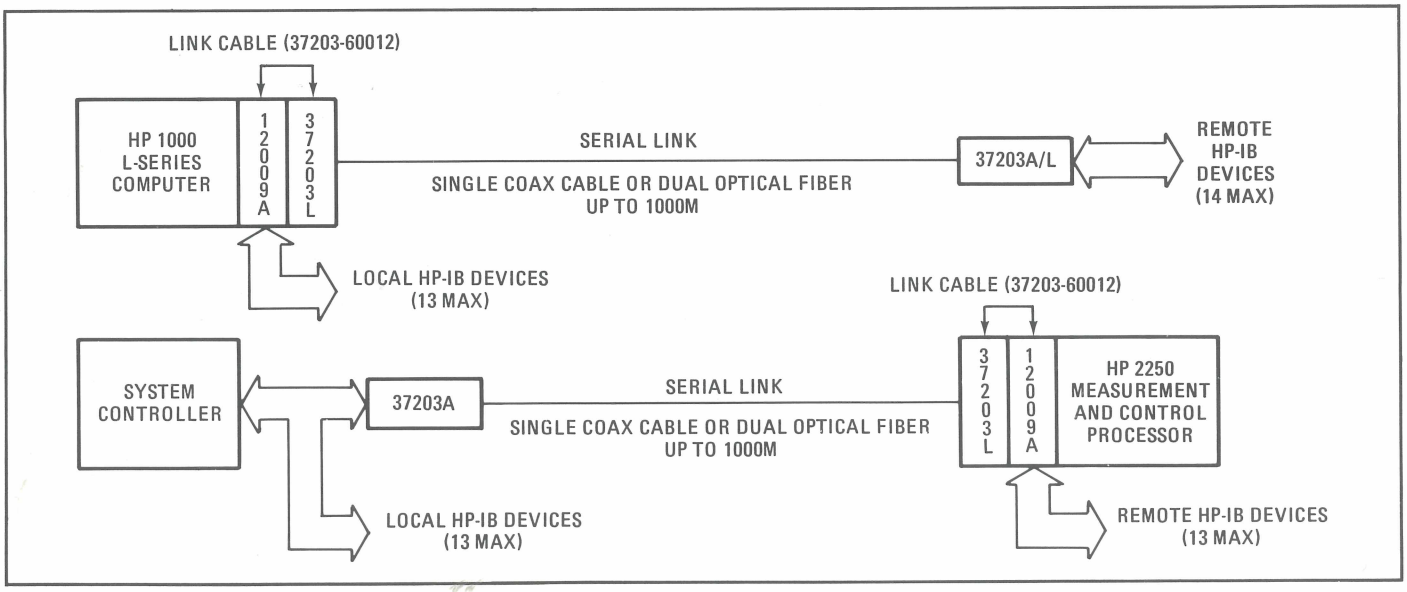
Drive circuits for the coaxial cable are powered by a floating supply (derived from the 25 kHz ac supply). Data is coupled to and from these circuits through optical isolators. This technique eliminates interference induced from unwanted ground currents which can otherwise be a major source of trouble. Further rejection of interference is provided by the construction of the recommended cable which incorporates a 100% screen shield.

Transmission Over Optical Fiber

Option 001 permits operation over duplex optical fiber as a user-selectable alternative to coaxial cable. Hewlett-Packard optical fiber is a strong, lightweight cable which is supplied in user-specified lengths, fitted with connectors ready for installation and use.

The use of optical fiber removes the metallic path between Extenders and eliminates all risk of electromagnetic pick-up on the link. Option 001 is recommended for use in applications where severe electromagnetic interference may be encountered or where the use of electrical signalling is not acceptable. The fiber optic cable is also safe in explosive environments or where ground potential differences exist between the ends of the link.

A further advantage of optical fiber is that it enables a higher byte transfer rate to be attained than is possible using coaxial cable when operating over transmission distances greater than 250m.



Application Information

The 37203L is designed for applications with the HP 2250 Measurement and Control Processor and with HP 1000 L-series Computers. In either case the 37203L is installed into the system chassis and occupies a slot adjacent to the 12009A HP-IB Interface card. The HP-IB Interface is linked to the 37203L HP-IB Extender card via an interconnecting cable (37203-60012) supplied with the 37203L. This is a 3-way cable which allows connection from the 12009A HP-IB Interface to two 37203L's or one 37203L and another integral HP-IB device. Other HP-IB devices may be connected to this Interface card using the standard HP-IB Interface cable (12009-60002).

The total number of devices that can be connected in a system is limited by the addressing capability of the bus. The number of devices that can be connected to either port of the extended bus is limited by normal HP-IB cabling and loading rules. The 37203L is one device load but does not use an address.

Configuration Information

2250 System Compatibility

The 37203L HP-IB Extender is compatible with all models of the 2250 Measurement and Control Processor.

HP 1000 L-series Computer Compatibility

The 37203L enables instrumentation systems to be controlled remotely over distances up to 1000m from the system controller using normal HP-IB programming and interfacing techniques. Some models in the L-series Computer range cannot provide the 25 kHz ac power required to generate the floating supply used to drive the coaxial cable. The 37203L can be used with these models but must be fitted with Option 001 and will only operate using optical fiber.

For reasons of data transfer rate the 37203L may not be configured on the same HP-IB Interface used for disc memory products or other peripherals which require the HP-IB Interface to be configured in the high speed mode.

Since the 37203L must be in an adjacent slot to the 12009A HP-IB Interface card it may be necessary to use a 12012A Priority Jumper card to continue the priority chain through an otherwise vacant card slot. The priority chain is jumpered through the 37203L Extender card.

Software Support

Since the function of the 37203L HP-IB Extender is to provide transparent extension of the HP-IB, it does not require the use of any additional system software. The Extender does not have an HP-IB address and does not require software integration.

Specifications

PHYSICAL AND MECHANICAL DESCRIPTION

The 37203L comprises three assemblies.

Printed Circuit Assembly (37203-60003)

The printed circuit assembly is plugged into a slot adjacent to the 12009A HP-IB Interface card.
Dimensions: 171 mm (6.7 in) wide, 289 mm (11.7 in) deep, 18 mm (0.71 in) high.
Weight: 0.25 kg (0.55 lb).

Link Cable Assembly (37203-60012)

This ribbon cable interconnects the 12009A HP-IB Interface card and the 37203L HP-IB Extender card.

Coaxial Cable Adaptor (37203-60013)

The coaxial cable adaptor bolts to a convenient point on the 2250 or HP 1000 L-system cabinet and provides a decoupled BNC connection to the coaxial transmission link.
Dimensions: 50 mm (1.97 in) wide, 30 mm (1.18 in) deep, 90 mm (3.55 in) high.
Cable Length: 1.5 m (59 in).

ELECTRICAL/ENVIRONMENTAL SPECIFICATION

DC Power Requirements: +5V : 750 mA.
25 kHz AC Power Requirements: 39V : 20 mA.
Operating Temperature: 0° to 55°C.
Storage Temperature: –40° to 75°C.
Relative Humidity: 5% to 95% at 40°C (non-condensing).

HP-IB INTERFACE

HP-IB is Hewlett-Packard's implementation of IEEE Standard 488-1978 and is in general compliance with each of the following standards and supports their major capabilities: IEEE Standard 488-1978, ANSI Standard MC1.1, IEC Standard 625-1.

Total compatibility among independently designed equipment interconnected via the 37203L HP-IB Extender is beyond the scope of this product, see section 6 of the above referenced standards.

OPTIONS

Opt 001 : Fiber Optics : provides capability of operation over HP 39200A/B fiber optic cable as a user-selectable alternative to coaxial cable.

Opt 910 : Specifies one extra copy of the 37203L Reference Manual.

Related Equipment

39200 SERIES FIBER OPTIC CABLE

Hewlett-Packard 39200 series fiber optic cable is designed for use with 37203A/L HP-IB Extenders fitted with Opt 001.

39200A is a simplex cable. 39200B is a duplex cable. Each channel consists of a fused silicon glass clad fiber surrounded by a silicon coating, buffer jacket and tensile strength members. The outer jacket is polyurethane. The two channels of the duplex cable are connected by an easily separated zip cord structure and channel identity is provided by an extruded ridge on one side.

39200 Specifications

Operating Temperature: −20° to +70°C.
Storage Temperature: −40° to +85°C.
Relative Humidity: 95% max at 70°C.
Max Tensile Force on Cable: 300N (Simplex cable)
600N (Duplex cable)
Max Tensile Force on Connector/Cable: 100N.
Minimum Bend Radius: 25 mm.
Approximate Dimensions: Simplex 3 mm/diameter.
Duplex 6.3 x 3 mm.
Weight: Simplex 8 kg/km
Duplex 17 kg/km.

Fiber optic cable is supplied to the length required and is connectorized ready for installation and use. Users should order the total number of cables and specify the length required in metres. Eg, for a 517 metre length of duplex fiber optic cable the order should read "39200B Fiber Optic Cable, one cable, 517 metres long".

For information on other Hewlett-Packard fiber optic products including unterminated cable and the connector assembly tooling kit, contact your local HP Sales Office.

37203A HP-IB EXTENDER

The 37203A HP-IB Extender is a mains powered unit designed for use in stand-alone applications. The 37203A is fully on-line compatible with the 37203L.

37203A Options

Opt 001 : Fiber Optic Interface
Opt 301 : Rack Mount Adaptor. Rack mounts a single 37203A.
Opt 302 : Dual Rack Mount Adaptor. Rack mounts two 37203A's together.
Opt 910 : Extra manuals.

For more information see 37203A data sheet.

COAXIAL CABLE

The use of Belden type 9248 cable is recommended. However any other cable which meets the following specification may be used.

Coaxial Cable Specifications

Nominal Impedance: 75Ω.
Attenuation (loss): 6.9 dB/100 metres at 100 MHz.
Resistance (inner + outer in series): 4.1Ω/100 metres.
Connector: BNC 75Ω. HP recommends the Trompeter type UPL 20-41 connector for use with Belden type 9248 cable.

For distances shorter than those specified in the table on page 2, 75Ω cable of poorer specification may be used. However the total attenuation and resistance should not exceed the values obtained using the recommended cable at its appropriate maximum distance. The connector should be chosen to match the cable type.

For more information, contact your local HP Sales Office or —
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